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545OneDrive2_00001286

# EPAct Light Duty Exhaust Fuel Effects Test Program

## Cost and timing feedback from SwRI

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# *Base Fuel Matrix (Cont'd)*

- Original scope of program
  - Tier 2 fuel effects (RVP, E10, T50,T90, Aromatics)
- Computer generated optimal design
- Fuel variables:
  - T50 (3 levels)
  - T90 (2 levels)
  - EtOH (2 levels)
  - RVP (2 levels)
  - Aromatics (2 levels)
- 16 fuels, 19 vehicles
- VOC speciation, some 50 deg, no PM speciation
- Original cost estimate = $4.2M
- Southwest estimate = Ex. 4 - CBI

# Base Fuel Matrix (Cont'd)

## Test Fuel Specification

| PROPERTY | UNIT | METHOD | BLENDING TOLERANCE | TEST FUEL | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Relative Density, 60/60°F | - | D4052 | NA | Report | Report | Report | Report | Report | Report | Report | Report |
| API Gravity, 60°F | °API | D4052 | NA | Report | Report | Report | Report | Report | Report | Report | Report |
| **Ethanol Content** | **vol. %** | **D5599** | **E0: < 0.1; E10: ± 0.5; E20: ± 0.5** | **0** | **0** | **10** | **0** | **0** | **10** | **0** | **0** |
| T10 | °F | D86 | ± 10 | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 |
| **T50** | **°F** | **D86** | **± 4** | **195** | **195** | **195** | **195** | **195** | **195** | **215** | **215** |
| **T90** | **°F** | **D86** | **± 5** | **300** | **300** | **300** | **350** | **350** | **350** | **300** | **300** |
| FBP | °F | D86 | - | <437 | <437 | <437 | <437 | <437 | <437 | <437 | <437 |
| **DVPE** | **psi** | **D5191** | **± 0.15** | **8.85** | **8.85** | **6.85** | **6.85** | **6.85** | **8.85** | **6.85** | **8.85** |
| **Aromatics** | **vol. %** | **D1319** | **± 1.5** | **15** | **40** | **40** | **15** | **40** | **15** | **15** | **15** |
| Olefins | vol. % | D1319 | ± 1.5 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| Benzene | vol. % | D3606 | ± 0.15 | 0.62 | 0.62 | 0.62 | 0.62 | 0.62 | 0.62 | 0.62 | 0.62 |
| S | mg/kg | D5453 | ± 5 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| RON | - | D2699 | ± 2 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 |
| MON | - | D2700 | ± 2 | 85 | 85 | 85 | 85 | 85 | 85 | 85 | 85 |
| (R + M)/2 | - | Calc. | ± 2 | 89 | 89 | 89 | 89 | 89 | 89 | 89 | 89 |
| C | mass % | Calc. | - | Report | Report | Report | Report | Report | Report | Report | Report |
| H | mass % | D4808 Method A | - | Report | Report | Report | Report | Report | Report | Report | Report |
| O | mass % | D5599 | - | Report | Report | Report | Report | Report | Report | Report | Report |
| Water Content | mg/kg | E1064 | - | Report | Report | Report | Report | Report | Report | Report | Report |
| Net Heat of Combustion | MJ/kg | D4809 | - | Report | Report | Report | Report | Report | Report | Report | Report |
| Oxidation Stability | minute | D525 | - | >240 | >240 | >240 | >240 | >240 | >240 | >240 | >240 |
| Copper Strip Corrosion, 3h at 122°F | - | D130 | - | <No. 1 | <No. 1 | <No. 1 | <No. 1 | <No. 1 | <No. 1 | <No. 1 | <No. 1 |
| Solvent-Washed Gum Content | mg/100 ml | D381 | - | < 5 | < 5 | < 5 | < 5 | < 5 | < 5 | < 5 | < 5 |

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# Options for Expanding

- Options for expanding program beyond base matrix:
  - 3-4 "real world" ethanol blends on all vehicles to generate data for GHG rule analysis – **would add** Ex. 4 - CBI **to base**
    - **Fuels:** E0, E10, E15, (E20) **Toxics:** Yes **Temps:** 50º & 75ºF
    - Could include N2O, NH3, HCN via FTIR for additional Ex. 4 - CBI
  - PM speciation
    - **would add** Ex. 4 - CBI There is as possibility of doing this PM work separately at NVFEL as a parallel program
    - Base option + GHG may provide some information, i.e. particle size and number, at no or little additional cost…still resolving
  - Expanded Base Matrix for E20 (proposed to DOE: ~$2 Million)

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# Project Timing

- Testing estimated to begin in March 2008
  - Most of that time is waiting for fuels (need to decide ASAP which option to select!)
  - Time also required for test cell upgrades (for 50ºF tests) and additional fuel drum storage capacity
- Ability to provide data for GHG rule
  - We would add 3 or 4 in-use fuels (E0, E10, E15+) to each option and test these fuels first for a preliminary dataset
  - Includes both 50ºF and 75ºF tests (75ºF tests done first)
  - SwRI can run 27 tests/week at 75ºF (18 at 50ºF)
  - At this rate (plus 30% margin of safety) and starting 3/03/08:
    - Option A: 19 vehicles * 3 GHG fuels =**14 weeks (e.g. 6/09/08)**
    - Option B: 21 vehicles * 4 GHG fuels =**21 weeks (e.g. 7/28/08)**

# Base Program Timeline

- Jan. 2008 – March 2008: Fuel blending
- April 2008 – March 2009: Emissions testing
- March 2009 – May 2009: Reporting
- Program schedule could be accelerated through:
  - Second shift work
  - Use of additional test cells
- Selected segments of test program could be executed shortly after launch

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